Flightfax
ARMY AVIATION RISK-MANAGEMENT INFORMATION
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HOT weather operations

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

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U.S. ARMY SAFETY CENTER

CONTENTS

POV FATALITIES through 28 February

FY02	FY01	3-yr Avg
43	36	44

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James E. Simmons
Brigadier General, US Army
Commanding

DASAF's CORNER

from the Director of Army Safety

Decision making at the appropriate level

The Army's Risk Management standard is an informed decision at the appropriate level of authority. In some cases, we aren't meeting that standard. Units are doing a good job of identifying and assessing hazards—but young leaders, whose experience level is not as extensive as it should be for making decisions that involve medium or high risk, are sometimes making those risk decisions.

When I was the Assistant Division Commander (Maneuver), 1st Cavalry Division, Fort Hood, Texas, the CG asked me to take a look at risk management in the Division. I took scenarios from the Risk Management Chain Teaching CD and asked several lieutenants to identify and assess the hazards, determine the level of risk—low, medium, high, or extremely high—and identify who had approval authority for the mission. Most of the lieutenants felt that they or their company commander had approval authority. I swore the lieutenants to secrecy and gave the same scenarios to battalion and brigade commanders the following day. Battalion and brigade commanders identified and assessed the hazards and determined the risk level. They felt that the risk decision should be elevated to at least battalion level for approval. A disconnect existed between the risk decision authority the lieutenants thought they or their company commander had, and what the battalion and brigade commanders perceived as within the purview of the lieutenants or the company commanders.

It's obvious that leaders at the platoon/company level should be given the opportunity to grow and the flexibility to make decisions so they can learn. But at the same time, they must know what the right and left boundaries are. Senior leaders must be involved in supporting and mentoring the platoon and company commanders, and deciding how far to let them go before reining them in.

The intent should not be to micromanage young leaders and stifle their learning and growth process. If the battalion commander/battalion command sergeant major takes the role of senior observer-controller, he or she can allow the learning, but stop the process before the accident. In FY 01, we had 10 Class A aviation accidents. In only one of those accidents was the battalion commander present during the planning, preparation, and execution of the training.

I have submitted my personal philosophy to you before and I do so again: Units that participate in tough, realistic training with **technically and tactically proficient leaders present** have significantly fewer accidents.

Two key points to consider: If your unit's SOP isn't specific on who has approval authority for each level of risk, then it may need revision. Junior leaders should not have to decide if they have risk decision authority. Spelling out clearly in the SOP who has decision authority for low-, medium-, high-, and extremely-high risk missions is one means of making sure everybody knows the boundaries. Whether it's through the SOP or some other educational process, make sure the risk decision approval authority is clear.

Second point: You may want to consider adding an extra step to your SOP. Once the decision of level of risk is reached, informing the next level in the chain of approval gives an extra look at the process.

Sometimes it's tough finding the right balance between mentoring/supporting and what some might perceive as micromanaging. It's not necessary to always be loved as a commander, but it's vital to always be respected for technical and tactical proficiency and competence. I challenge each of our commanders to set the professional example of being involved—by word and deed—because each young leader you mentor during the planning, preparation, and execution of missions is your investment in the future of our Army.

Clearly defined risk decision approval authority for each level of leadership will help us ensure that we have combat ready battalions capable of going out and conducting tough, realistic training without hurting or killing soldiers before crossing the line of departure. If we practice it every day, every training mission, once we get into actual combat conditions, risk management will be an integral part of how we think and maneuver our way through situations as conditions change instantaneously.

Train Hard – Be Safe.

—BG James E. Simmons
Director of Army Safety

Visual illusions of the desert

Dusting off what we learned in the 90s, here's a revisit to some aviation lessons learned about how the eye reacts to desert environments, especially under Night Vision devices. These are the most common illusions encountered in Southwest Asia.

False horizon or lack of horizon. Light colored areas of sand surrounding a dark area—for example, sand dunes bordering a dry lakebed blending with the night sky can create a false horizon. Sand, dust, haze, or fog may also obscure the horizon.

Height perception illusion. This sensation of being higher or lower than you actually are is due to poor contrast and lack of visual references. It may result in a tendency to inadvertently descend to acquire visual cues.

Ground light misinterpretation. This illusion can occur when ground lights are confused with stars or other aircraft. An aviator who confuses ground lights with stars will unknowingly position the aircraft in unusual attitudes, to keep what he perceives as stars above the aircraft. When ground lights are confused with other aircraft, aviators tend to adjust attitude incorrectly based on the relative position of misinterpreted ground light.

Fixation. When an aviator fixes attention on high-interest targets/objects and stops scanning—the result may be an aircraft flown into the ground.

Crater illusion. Viewing the periphery of the IR band-pass filter (pink light) or IR searchlight gives the illusion that flat terrain, such as that found in a dry lakebed, tends to slope upward. Viewing another aircraft landing using these lights can give the illusion that the observed aircraft is descending into a crater, when it fact it is actually in straight and level flight over a flat terrain.

Lack of motion perception (motion parallax). At low-level flight altitudes, and relatively slow airspeeds, the lack of discernible terrain features may make the pilot think his/her aircraft is at near-zero groundspeed, when it is actually moving forward.

Sources: FM 1-301 Aeromedical Training for Flight Personnel and TC 1-201, Night Flight Techniques and Procedures.

Aircraft plus high temperatures can equal DANGER

Virtually every area of the world in which the Army can be expected to operate will have temperatures high enough to significantly impact the way Army aviation performs its mission. High temperatures will affect the performance of the aircraft, aircraft engines, and aircrews rarely in a beneficial way. Luckily high temperatures are not likely to spring up unexpectedly like an afternoon thunderstorm, but rather will have an impact over a broad time and area.

Why do high air temperatures affect the performance of aircraft? Charles Law states that the volume of a fixed mass of gas at a constant pressure is directly proportional to its absolute temperature. Or put another way, $\frac{V_1}{T_1}=\frac{V_2}{T_2}$. Density is a measure of mass divided by volume, $\frac{\mathbf{mass}}{\mathbf{V}}=\rho$. Working around the equations we find that as temperature increases, volume increases, and density of the air will decrease. This is a simplified discussion of density altitude. With density in the numerator of the lift equation, the lower the density of air, the less lift produced by an airfoil. Rotary wing aircraft compensate for the loss of lift by increasing the Coefficient of Lift or increasing angle of attack. Higher angles of attack mean more power required to maintain the rotor rpm. Bottom line: the higher the ambient air temperature, the more power it takes to keep an aircraft aloft, assuming no change in pressure. The "hover" chart from chapter seven of the –10 confirms these generalizations. Higher temperatures mean more power to do the same job.

Another impact on the performance of an aircraft is the way that temperature affects the engines. Turbine engines take ambient air, compress it, mix in some fuel, add spark and then harness the energy from the expanding exhaust gasses. The first step of the process is directly affected by the air density and the temperature of the ambient air that is introduced into the compressor. The "power available" charts from chapter seven of the –10 demonstrate the decrease in available power as the temperature increases. This means as temperature increases the power needed to produce the same lift is increasing at the same time the engines are producing less power.

Mission ranges and available payloads can all be expected to decrease as the temperature increases. As an example, a CH-47's fuel flow, and mission range, will increase 7% with a change from fifteen to thirty-five degrees Celsius. It may be necessary to plan missions in cooler parts of the morning, or at night, in order to complete missions that require especially long routes or high payloads.

In addition to the effects on the performance of the aircraft, high temperatures will affect the crews as well. High temperatures will make crewmembers sweat more, which can easily lead to dehydration. The effects of even mild dehydration include decreased coordination, fatigue, and impairment of judgment, none of which are welcome in the cockpit.

Normally, the average day person loses four liters of fluid per day, which is generally replaced by the fluid we drink and the foods we eat. Exercise, sweating, diarrhea, temperature, or altitude can significantly increase the amount of daily fluid we need. The most common cause of increased fluid loss is exercise and sweating. While one is sitting in a hot cockpit, still more water is going to be lost to sweat. A 2% loss of body weight to dehydration will cause a significant loss of performance. For an average 200-pound crewmember, that equates to about two liters of water a day. The average adult loses about 0.7% of sweat per day, but sweat losses can be as much as 2.5 L per hour—far more than the amount which will cause a loss of performance.

As crewmembers operate aircraft on long missions, they need to hydrate to replace these fluids lost through sweat. On long missions crew relief may become another problem, one that will be exacerbated by the extra fluids consumed in hot weather. Utility and cargo aircraft with auxiliary fuel tanks can fly missions up to six hours, and aircraft with aerial refueling capability can fly even longer. Multiple trips through the FARP during long operations decrease even further crew opportunities to relieve themselves. All types of aircraft crews can encounter this problem, and commanders need to plan ahead for this.

Crewmembers can also be at risk from burns caused by coming in contact with heated metal during maintenance, inspections, or servicing. Wearing gloves during preflights and maintenance work can be a real benefit when outside temperatures are 35 degrees Celsius in the shade, and the aircraft has been baking in the sun all day. Long sleeves may be needed as well to work on aircraft that have hot metal panels or exhaust shrouds.

Additionally, the interiors of aircraft can exceed the temperature that will degrade or even damage avionics components. Opening the aircraft up to allow ventilation, or placing shades over the glass areas of the aircraft can significantly reduce the temperatures inside. Rapid temperature changes that can occur in a desert environment between day and night are conducive to the formation of condensation. This condensation can cause corrosion, water accumulation and fungal growth in partially filled fuel tanks. Other maintenance concerns for hot weather include distortion of seals, softening of fiberglass and plastics, and breakdown of lubricants.

Hot Weather environments are common for today's Army and require extra caution and planning from aircrews and maintenance personnel. Additional information can be found in the FMs and web sites listed below.

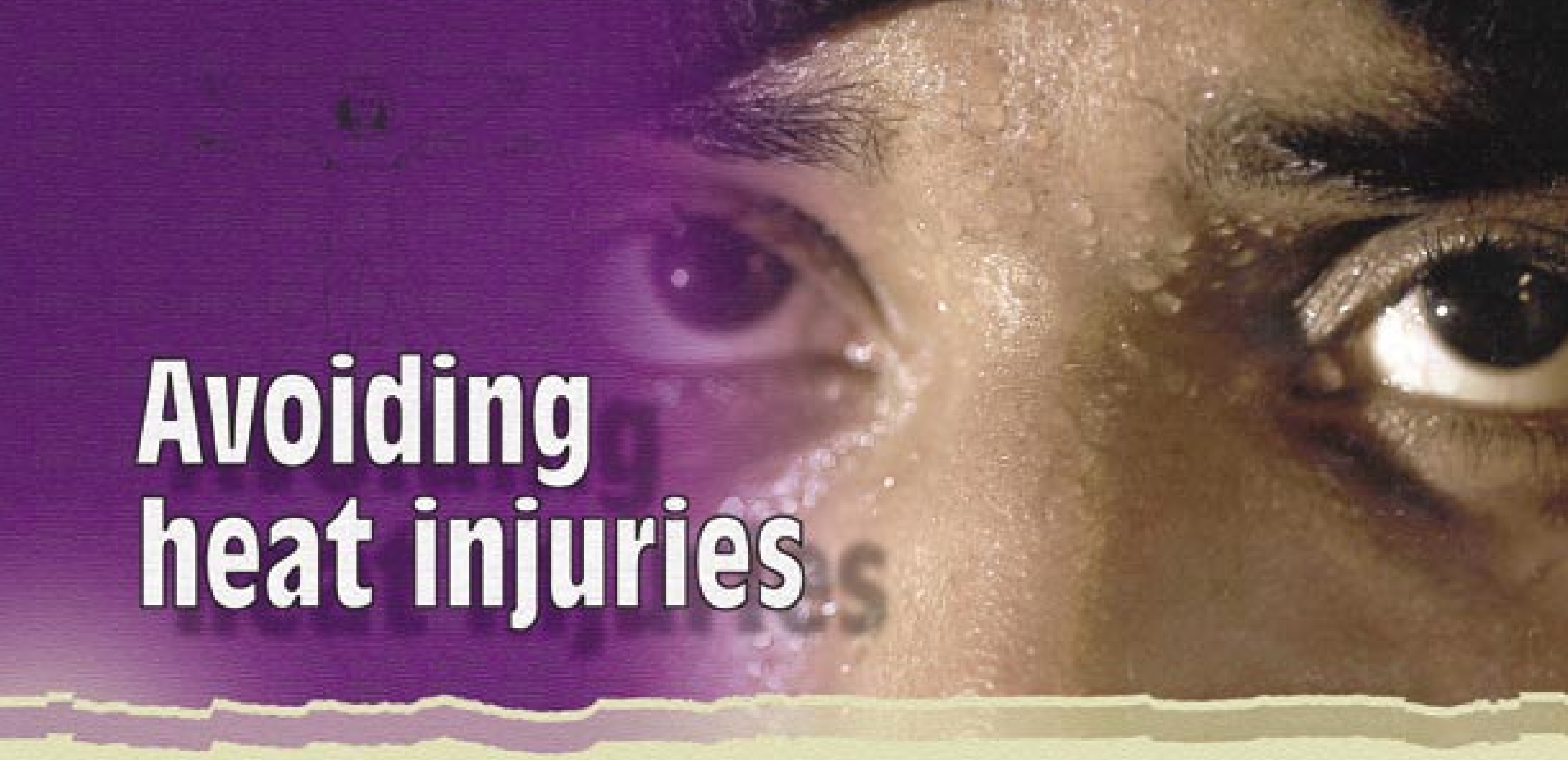
■ FM 3-04.202(1-202). *Environmental Flight*. 23 February 1983

■ FM 3-04.203(1-203). *Fundamentals of Flight*. 3 October 1988.

■ **http://www.usatoday.com/weather/wdenalt.htm Information on Density altitude**

■ Comprehensive information on heat injury and prevention can be found at **http://usachppm.apgea.army.mil/heat/**

—CW3 Dan Cramer is a CH-47 Maintenance Test Pilot for B Company, 1st Battalion, 228th Aviation Regiment, Soto Cano Airbase, Honduras http://www.usarso.army.mil/1st_228th/default.html



Avoiding heat injuries

All heat injuries are preventable, but in order to prevent heat injuries, it is important to understand them. Heat stress is caused by the interaction of three main variables; the mission, the environment, and the soldier. Each of these main variables has several considerations of its own—together, they can set the stage either for causing, or preventing a heat injury. Failing to consider these variables while planning, performing risk assessment, or while determining risk management steps, will result in heat injuries.

Mission: How hard are the soldiers going to have to work (working at an air conditioned desk, long periods in the aircraft sitting on the ramp or LZ in the sun, doing heavy maintenance out on the ramp)? What kind of uniform is required (Sleeves up BDUs, full flight gear, MOPP gear)? What kinds of loads will they have to deal with (fuel and ammo at a FARP, patients on litters, weapon and Kevlar only)?

Environment: This is the first thing most people think of. Unfortunately, it is often the only thing. How hot is it? How humid is it? Is there a lot of direct sun, or is there a lot of cloud cover? Is there any wind, or is it calm? What is the terrain like—grassy, jungle, desert, flat, hilly?

Soldier: Are soldiers acclimatized? Are they able to get adequate rest? How about nutrition, and hydration? Are the soldiers fit for the mission? Are any ill or on medications? Finally—has anyone had a prior heat injury?

If you can't answer these questions, you won't be able to take risk mitigation steps, and you will likely get heat injuries—so what risk mitigation steps can be taken?

1. Monitor your soldiers! This is probably the most important step. If one soldier becomes a heat casualty, then it means that other soldiers are at risk; if soldiers appear to be dragging, the unit should be evaluated quickly—they might not just be tired. Make sure special attention is given to soldiers who are ill, on medications, or have had a prior heat injury.

2. Acclimatization. It takes up to two weeks to become acclimatized. When deployed, leaders must take this process into account when planning missions.

3. Fluid intake. Soldiers should drink adequate fluids before and during the operation or training exercise (see chart on next page).

4. Physical conditioning. Infections, fever, recent illness, overweight, fatigue, drugs (cold medication), and previous heat injuries may

Fluid Replacement Guidelines for Warm-Weather Training
(Applies to Average Acclimated Soldier Wearing BDU, Hot-Weather)

		Easy Work		Moderate Work		Hard Work	
Heat Category	WBGT Index °F	Work/Rest*	Water Per Hour	Work/Rest*	Water Per Hour	Work/Rest	Water Per Hour
1	78-81.9	No limit	½ qt	No limit	¾ qt	40/20 min	¾ qt
2 (Green)	82-84.9	No limit	½ qt	50/10 min	¾ qt	30/30 min	1 qt
3 (Yellow)	85-87.9	No limit	¾ qt	40/20 min	¾ qt	30/30 min	1 qt
4 (Red)	88-89.9	No limit	¾ qt	30/30 min	¾ qt	20/40 min	1 qt
5 (Black)	>90	50/10 min	1 qt	20/40 min	1 qt	10/50 min	1 qt

**Rest* means minimal physical activity (sitting or standing) and should be accomplished in the shade if possible.

Note 1: The work/rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hours of work in the specified heat category. Individual water needs will vary ± ¼ quart per hour.
Note 2: CAUTION: Hourly fluid intake should not exceed 1½ quarts. Daily fluid intake should not exceed 12 quarts.
Note 3: Wearing MOPP gear or body armor adds 10°F to WBGT Index.

Examples:

Easy Work	Moderate Work	Hard Work
• Walking hard surface at 2.5 mph, <30-pound load • Weapon maintenance • Manual of arms • Marksmanship training • Drill and ceremony	• Walking hard surface at 3.5 mph, <40-pound load • Walking loose sand at 2.5 mph, no load • Calisthenics • Patrolling • Individual movement techniques; i.e., low crawl, high crawl • Defensive position construction • Field assaults	• Walking hard surface at 3.5 mph, >40-pound load • Walking loose sand at 2.5 mph with load

Note: Soldiers who are overweight, dieting, or past heat casualties are more prone to heat injuries. As a result, their activities must be closely monitored.

increase the risk of heat stress.

5. Work schedules. If the tactical situation allows, heavy work and activities that require strenuous physical exertion (road marches/calisthenics) should be scheduled for early morning or late evening. Avoid working in the direct sun, whenever possible.

6. Loose-fitting clothing. Wear lightweight clothing that allows circulation of air and enhances the cooling evaporation of sweat. If the tactical situation allows, commanders need to consider permitting unblousing of boots, unbuttoning of BDU shirts, or other measures. Removal of BDU shirts should be done with caution, as this may increase the risk of sunburn.

7. Wet bulb globe temperature (WBGT). The

WBGT index is the best means of evaluating environmental heat. Commanders and NCOs must monitor the heat index, and if tactically possible, modify activities and soldier monitoring accordingly.

8. Be able to recognize heat injuries; perform first aid; and have a good, workable, and rehearsed evacuation plan:

■ *Sunburn.* Many people do not think of sunburn as a heat injury, but it is a frequent cause of injury to soldiers, and repeated exposures can lead to skin cancers later. Anyone can become sunburned, even on cloudy days. Fortunately, it is totally preventable, either through the use of sunscreen, or simply by keeping body parts covered.

■ *First Aid:* Cover the body part that is being burned. If there is pain or blistering with the burn, seek medical attention.

■ *Heat Cramps.* are painful cramps of the muscles caused by a heavy loss of salt through sweating. An individual may lose more than a quart of water per hour through sweating alone. Vomiting, diarrhea, or urination can make this, and all dehydration injuries, much worse. Generally, the cramps will disappear with treatment.

■ *First aid:* Move the victim to shade and loosen clothing. Treatment includes frequent intake of water, a cup (8 oz) every 15-20 minutes, not to exceed 1½ quarts per hour. Thirst is not an adequate indicator of dehydration. If cramps persist, dissolve ¼-teaspoon of table salt in one quart of water, and have the victim slowly drink at least one quart of the salt solution.

■ *Heat Exhaustion* is caused by excessive salt depletion and dehydration and is characterized by profuse sweating, headache, tingling sensation in the extremities, weakness, loss of appetite, dizziness, nausea, cramps, chills, and rapid breathing.

■ *First aid:* Lay victim flat in a cool, shady spot. Elevate feet and loosen clothing. Pour water on victim and fan to cool. If conscious, have the victim drink at least one canteen full of cool water with the salt solution. If soldiers do not recover after an hour, evacuate to the nearest aid station or other facility.

The important thing to remember about heat exhaustion is that there is often a fine line between heat exhaustion and heat stroke, and it is often hard to distinguish the two initially. If there is any doubt, assume the worst and start treating the casualty as if it were heat stroke.

Heat stroke can cause death or permanent disability if emergency treatment is not given. Heat stroke occurs when the body becomes unable to control its temperature; the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. Lack of sweating in the heat is often listed as an important symptom of heat stroke; however, mental confusion, or disorientation will usually be seen first. Other symptoms include throbbing headache, flushed dry skin, nausea, and elevated body temperature.

■ First-aid: THIS IS A MEDICAL EMERGENCY—SEEK IMMEDIATE MEDICAL ATTENTION. Move the victim into the shade and cool with ice packs. If packs are not available, soak or douse victim with cool water. Fan body and elevate feet. Do not immerse in ice water. Do not try to give water to an unconscious victim. If medics or combat lifesavers are present, start intravenous (IV) fluids. Ensure the cooling process is continued during transport to medical facility.

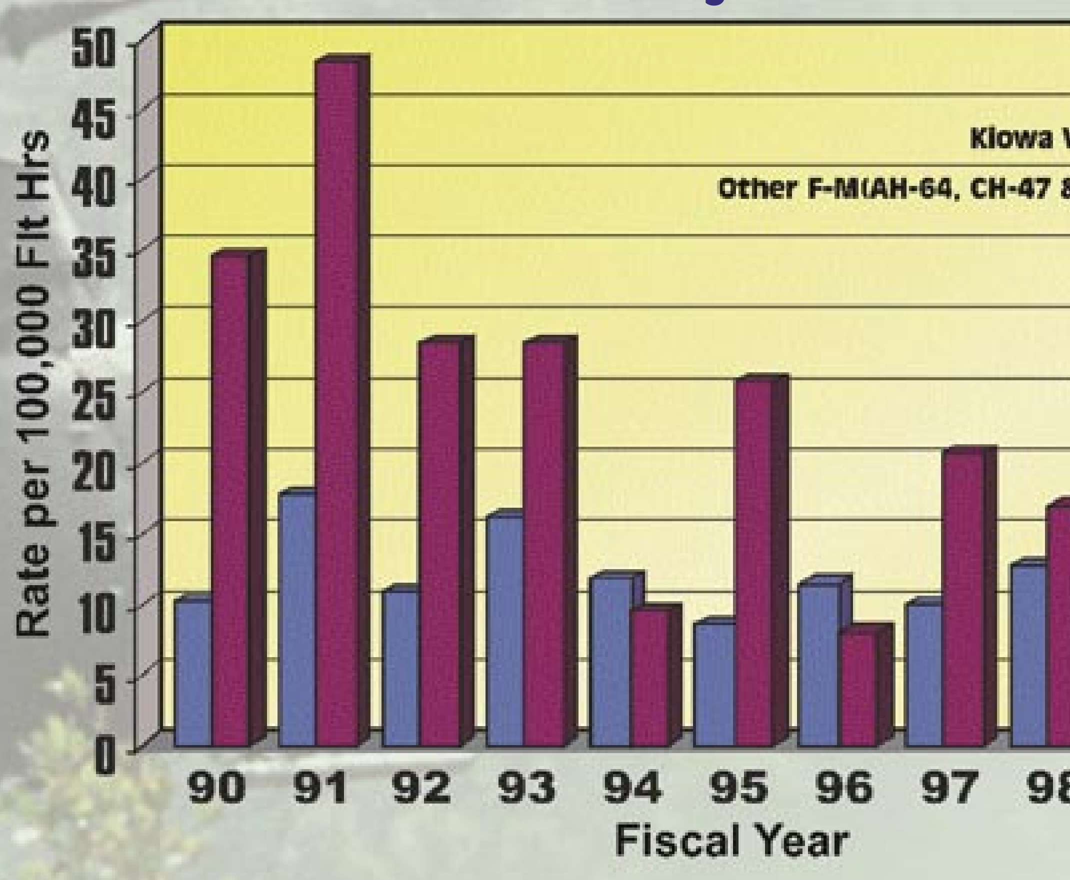
■ Bottom line: Although commanders and supervisors are responsible for heat injury prevention, every soldier can do his or her part—both by knowing about heat injuries, and by being a an extra set of eyes and ears monitoring buddies for the supervisors and commanders. As mentioned, all heat injuries are preventable, but like everything else, a team effort is always best to beat the heat.

—POC: LTC Robert Noback, Command Surgeon, DSN 558-2763 (334-255-2763), nobackr@safety-emh1.army.mil

Kiowa Warrior Revisited

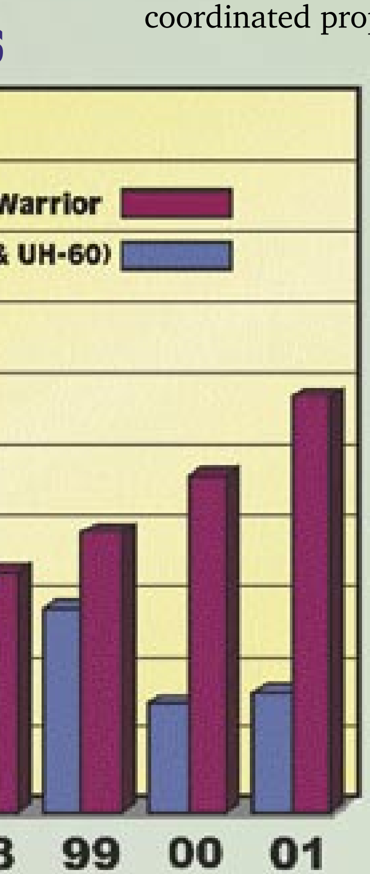
The November 2001 issue of *FlightFax* asked the question "Is there something wrong with the Kiowa?" Here we provide an update based on the KW Aviation Safety Investment Strategy Team (ASIST). This should not be construed as

Class A-C Flight Accident Rates



operational guidance, but is simply intended to keep the KW community informed of progress underway. Specific requirements will be communicated through operational channels as the actions mature. The KW ASIST Team will provide additional highlights in future *Flightfax* articles.

As with most aircraft, the KW flight accident rate changes considerably from one year to the next. Figure 1 shows this variation, as well as the rate for other Force Modernized helicopters (ie, AH-64, CH/MH-47 and UH-60) since Fiscal Year 1990. The KW accident rate peaked during FY90-91, as operations built toward Desert Shield/Storm. The KW rate has risen progressively over the last six years, and currently is the highest in the last decade. In response to this upward trend, the Commanding Generals of the Aviation Center, Aviation and Missile Command, Program Executive Officer–Aviation, and the Safety Center collectively chartered KW ASIST to analyze operational experience and develop a coordinated proposal to enhance KW safety.



KW ASIST conducted a risk-based, systems analysis to define hazards and potential controls to reduce KW losses, using FY 94-01 Class A-C accident reports as the baseline. ASIST goes beyond the traditional ‘pilot error’ approach and defines the hazards built into the overall system, and the controls that could be applied from all DTLOMS (Doctrine, Training, Leader Development, Organization, Materiel and Soldier). The overall system used for the ASIST analysis is depicted in Figure 2.

ASIST analysis is exhaustive and typically identifies over 100 separate hazards. This was true in the KW analysis. The top nine hazards contributed to a majority of the overall losses as prioritized in Figure 3. Unlike traditional analyses that focus on mistakes, these hazard statements describe conditions, built into the operational culture, to which KW crews are exposed. For each hazard, this chart depicts the number of accidents in which each hazard was identified (shown by the top number in the columns for FY94-98, FY 99-01 and total). ASIST assessed the risk associated with each hazard by calculating its contribution to overall KW losses, and combining accident frequency, number of casualties, and annual cost of each accident. Figure 3 depicts the contribution of each hazard

Kiowa Warrior System Characteristics

- **Doctrine**
  - Typically operated at near max gross weight and power
- **Training**
  - Only force modernized aircraft w/o simulator
  - OH-58D(R) not initially fielded in schoolhouse
- **Leader Development**
  - Typical of other aviation
- **Organization**
  - Two diverse missions with one platform (recon - Cav squadrons and light attack - Attack batallions)
  - Unit transitions to OH-58D(R)
- **Materiel**
  - No designated Integrator
  - “Interim system”, with no funded sustainment program
  - Early 60’s technology on airframe & drive (in common only with CH-47/MH-47)
  - Glass cockpit (multiple pages)
  - No buffer between –10 and –23 limits
  - Power management
    - Only single engine, force modernized aircraft
    - Reduced inertia main rotor
    - Engine responsiveness
    - Varied Modes (FADEC aircraft revert directly to manual mode, while ESC reverts to analog backup)
- **Soldier**
  - Typical of other aviation platforms

Prioritized Hazards

ID	Hazard Statement	FY94-98	FY99-01	Total
318	Selective enforcement of standards may result in damage to aircraft or injuries as a consequence of available controls not used (published standard not the same as the accepted standard)	25 (6.7%)	13 (14.1%)	38 (9.4%)
206	Hovering operations under high workload environment (eg. close proximity to obstacles, NVG or gunnery) may result in loss of situational awareness, damage or injury	13 (27.1%)	7 (2.0%)	20 (17.1%)
212	Crew ability to perform a successful autorotation significantly degraded due to inherent undesirable autorotational characteristics.	10 (1.5%)	7 (1.1%)	17 (1.3%)
238	Loss of situational awareness caused by poor division of attention (focus inside cockpit, fatigue and stress) may result in incorrect flight control input at critical flight phases and aircraft damage	11 (8.5%)	5 (2.9%)	16 (6.5%)
201	Task saturation during simulated engine failure may result in inability to adequately perform tasks (throttle position/power available), resulting in unplanned autorotative landing and aircraft damage.	9 (1.9%)	2 (1.1%)	11 (1.5%)
316	Commanders lack experience or seasoned leadership to manage risks with that unit	6 (2.0%)	3 (1.1%)	9 (1.7%)
327	Manual throttle operation can result in aircraft damage (overtorque, overspeed, hard landing)	0 (0%)	8 (2.6%)	8 (1.2%)
218	In accident sequence, aircraft structure may transmit loads that exceed human tolerance in otherwise non-injurious environments	1 (4.2%)	7 (43.4%)	8 (17.3%)
234	AAAR does not provide enough information for proactive risk management	6 (1.7%)	28 (11.3%)	34 (6.1%)

to overall losses by the bottom number in each of the columns (in parentheses). Figure 3 indicates that the top three hazards in KW operations have remained relatively constant over the last eight years, while two hazards (item numbers 201 and 316) have significantly decreased, and three hazards (items 327, 218 and 234) have significantly increased during the most recent period.

Next, ASIST identified over 150 controls that could reduce the risks associated with KW hazards. The KW ASIST Team documented near term, mid-term and long term actions in all elements of DTLOMS, and prioritized them from the standpoint of their potential impact on risk reduction. The ASIST analysis took a '*resource unconstrained*' perspective in defining these potential investments, regardless of current funding levels.

Working in partnership, the Aviation GOs then considered resource constraints to optimize the return on investment within the remaining KW operational life, with a target to bring KW losses in line with other force-modernized helicopter fleets. This target defined a reduction in KW accidents of approximately 58 percent. Using this target, the Aviation GOs mutually developed a consensus of the actions required, reflecting accident cost return on investment, as well as other operational considerations. These actions were documented in an Aviation Safety Action Plan (ASAP) for KW.

The KW ASAP lays out a mutually agreed upon set of immediate, mid-term and long term actions required to address the most critical hazards. ASIST concluded that hazards associated with FADEC and SEFT contribute to, but are not the only driver of, the recent upward trend. Other hazards have contributed to greater losses long term – and continue to do so as shown by the items in Figure 3. Actions to address near term issues have been initiated by the Aviation GOs. Highlights of some actions currently being implemented or under development are:

■ Enlist the support of the senior Army leadership to elevate command emphasis to enforce standards in all areas of aviation development, training and operations. This is not intended to be a 'UCMJ blitz', but a campaign to promote mentorship and apprentice programs, as well as realistic risk assessments providing feedback to commanders as operational conditions change.

■ Advocate an interim change to AR 95-1 to require (DTC/DTM) data collection devices (if available) be installed for all flights.

■ Modify the ATM to increase the minimum entry altitude for initiation of simulated engine failure training.

■ Initiate an ASAM to incorporate a throttle index mark on the right hand collective.

■ Deploy DES mobile training teams to every OH-58D(R) unit to train and assess FADEC manual throttle operations. Until the R model IPC is established at USAAVNC, require newly assigned IPs in an R model unit to receive their R model qualification from DES. In the meantime, the Aviation GOs will consider a moratorium on manual throttle operations pending the DES or MTT assistance visit.

Mid-term KW ASAP identified actions required, to include: improvements to ANVIS; more frequent SEF training; minimum operational experience for selection as an aviation commander; broadened Pre-Command Course training; modifications to the KW MFD; link the ASIST database to AKO to provide field access to risk management information; expand the Army's accident investigation process to include 'hazards-based investigation'; enhance the Army's Crew Coordination Training programs; fully fund the KW Safety Enhancement Program; and field a reversionary governor for FADEC. Some, but not all, of these actions are funded (as well as longer term actions identified by the KW ASAP.) Full implementation of the KW ASAP will require additional funding support.

Even though the original purpose, simply stated, was to develop the KW ASAP for funding consideration at HQDA, it became clear that the resulting information on hazards, risks and controls would also be of use in risk managing operations at a unit level. Some important enhancements in ASIST data base management were developed during this KW analysis. Working in concert, the ASIST agencies will explore linking risk management information through Army Knowledge Online (AKO).

One issue of immediate operational interest is the quality of Aviation Abbreviated Accident Reports (AAAR's). The ASIST analysis noted a dramatic recent increase in the frequency of AAARs received from field investigations that did not provide enough information for identification of the hazard(s). In some categories of accident events, 50% of all AAAR's were below the quality needed to support proactive risk management. Previous ASIST analysis of other platforms demonstrates that this shortcoming is not confined to the KW. Unit ASOs can significantly assist risk management efforts at the Department of Army level by ensuring all accident investigations are reported using the guidance provided by AR 385-40 and DA Pam 385-40.

In conclusion, rising risks in Kiowa Warrior operations threaten to jeopardize the OH-58D as a platform in cavalry and attack formations. Aviation GO's have initiated actions needed to ensure safe operations in the immediate future. In the longer term, KW safety investments will need to be synchronized in step with Aviation Transformation. As resourcing decisions are made at HQDA, the Aviation GOs have directed that the ASIST analysis will be continued and followed up through the KW System Safety Working Group.

—Walter M. Garner, US Army Aviation Center; I. Russell Peusch, Jr., US Army Aviation & Missile Command; Carl Turner, RAM Inc

Ready for the future—the ARNG High Altitude Aviation Training Site

Aviation operations are currently being conducted throughout the world in austere mountainous terrain, including Afghanistan, Yemen, and the Philippines. Are you prepared to fly and fight above 8,000 feet? Most of our aviation forces are operating at, or near sea level, where aircraft have abundant power and controllability. Operating at high-density altitudes, in rugged unforgiving terrain, facing both human, and environmental enemies will require training to ensure your unit is prepared and capable. Modernized aircraft succumb to the effects of density altitude, do not be overconfident; technology alone will not ensure your success!

The High-altitude ARNG Aviation Training Site, (HAATS) exists to train your aircrews to succeed in this challenging environment. The HAATS has been conducting graduate level flight training since 1987, at the Eagle County (Colorado) Airport. The training area includes nearly one million acres. Operating from 6,500 feet MSL to 14,000 feet MSL provides insights into the planning and judgment process that simulation cannot replicate. Using an objective power management process known as “Target Torque” which supplements all Aircrew Training Manuals, commanders and crews quickly discover, and correct existing training deficiencies.

Use Ours or Bring Yours

The primary training aircraft at the HAATS are the venerable UH-1 and OH-58, both of which are excellent trainers for the power management process. However, HAATS is capable of training in the UH-60 and CH-47 provided the attending units bring their own aircraft. The current Program of Instruction is one week in length for the initial qualification course. Approximately 20 hours of ground instruction, and 7.5 hours of flight instruction per aviator, provides relevant insights that expand the conceptual frame of knowledge. A one-week Instructor Pilot (IP) course is also offered, and serves to establish basic instruction capabilities for unit level training. The course consists of approximately 13 hours of individual flight instruction, and 20 hours of ground instruction.

The HAATS Power Management Mountain Qualification Course (HPMMQC) focuses on individual and crew competencies requisite to safely prepare and conduct operations in power limited mountainous environments. Individual competencies must be understood prior to collective training. To date, the environmental enemy in Afghanistan has claimed more lives than the human enemy. Take action before your unit is deployed. Being trained in a truly power limited mountainous environment will allow for local training to refine the concepts learned at HAATS. In a resource constrained environment, it is impossible to become an expert in mountain operations in one week with 7.5 hours of flight time; however, once learned, the power management and planning processes can be incorporated into your local and tactical SOPs.

HAATS stands ready to help you with your training needs. For more information, or to contact HAATS go to Coloradoguard.com and look for the High-altitude ARNG Aviation Training Site link; or contact HAATS Operations Officer CW4 Such, or the Operations NCO, SFC Kipferl at DSN 877-8180 x 2915 or Commercial 970-524-7702. HAATS ATRRS School code is 961A.

As we move to transform to a capabilities-based force, we must possess the ability to respond rapidly anywhere in the world with trained and ready tailored forces. Forces capable of operating in any environment day or night, in desert or mountainous terrain. Remember, we can’t win wars if we crash getting to the fight!

—LTC Joel Best, CO ARNG, Commander, HAATS, DSN 246-0950 (970) 524-7702, Joel.Best@co.ngb.army.mil

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

AH-64

Class A

A model

■ Accident aircraft was trail in a flight of four when the remaining crews determined that contact had been lost. Aircraft was subsequently located. One crewmember sustained fatal injuries, one crewmember injured. Aircraft was totally destroyed.

Class C

A model

■ Prior to takeoff, aircraft's OIL HOT transmission No.1 light and caution light illuminated. When PC attempted to start Auxiliary Power Unit, a loud whine was heard, followed by an explosion from the transmission area. Emergency shutdown was performed without further incident. Postflight inspection revealed damage to No.7 drive shaft, APU PTO clutch, mast support brace, and adjacent wire bundle.

D model

■ Postflight maintenance inspection confirmed NR peak of 199% during engine shutdown. Throttle had inadvertently been placed in the ECU lock-out position during shutdown.

C-12

Class D

R model

■ On take off, prior to 65 knots, aircraft struck several birds. Take off was aborted with no further incident. On postflight inspection the crew noted that one bird went through right engine propeller. Second bird struck radome, resulting in several cracks.

CH-47

Class A

D model

■ Trail aircraft in multiship flight struck a sand dune. Front gear separated, rear gear pushed up and back, aft ramp separated, right main fuel tank pushed in, floor buckled, stringer damaged. Crewmember injured.

■ Aircraft was parked when winds in excess of 70 knots caused blades to come unfastened. Damage to static stops, a tube near the transmission and the forward rotorhead.

E model

■ Trail aircraft in flight of two descended into ocean waters. Lead aircraft observed the trail aircraft impact the water, buckle and disintegrate. A huge fireball was observed after the aircraft impacted the water. Aircraft lost. Ten fatalities.

Class C

E model

■ While aircraft was disconnecting from refueling aircraft, refueling hose contacted the main rotor blades. Two were damaged.

OH-58

Class E

DR series

■ During termination of an NOE hover deceleration, aircraft vertical sink rate was arrested with collective application. Audio tone for high torque sounded for less than 1 second. Collective was lowered to reduce torque. Engine monitor page 1 indicated a max mast torque of 120%, page 3 indicated >103% for 2 seconds and >116% for no time. Mast torque of >116% requires a visual inspection. The inspection was completed with no damage noted.

TH-67

Class C

■ Aircraft was in cruise flight with a student at the controls for IERW training. Crew heard a loud bang and vibrations were felt in the pedals. IP initiated emergency procedure for loss of tail rotor control. Aircraft was landed in an open field. Postflight inspection revealed that a section of the tail rotor driveshaft and hangar bearings had separated.

UH-1

Class E

H model

■ During the engine start sequence, as N1 passed through 5%, N1 accelerated to 48.8% and then froze in place. All other engine indications were normal. Crew aborted the start sequence and terminated the flight.

Maintenance personnel replaced N1 Tach, performed MOC and released aircraft for flight.

UH-60

Class C

A series

■ Aircraft contacted a tree during terrain flight. High frequency antenna, stabilator, tailwheel access panel and lower anticollision light damaged.

L series

■ Crew discovered damage to four main rotor blades during postflight inspection after aircraft day air assault training into confined area.

Class E

A series

■ During flight, crew observed the #1 engine oil pressure level momentarily indicated below normal limits. On the landing phase of the flight, the #1 engine oil pressure level dropped below the minimum of 20 PSI, requiring the crew to perform an emergency engine shutdown of the #1 engine. Crew terminated the flight and performed a normal aircraft shutdown without further incident. Maintenance inspection revealed the #1 engine lost its entire quantity of oil and an engine internal seal had apparently blown. Engine replaced.

Mobile Training Teams Come to You…And the Price is Right

Do your soldiers need training on Risk Management and other important safety related force protection issues? If your answer is "yes", then we have the courses for you! The NCO and Junior Officer Professional Development Mobile Training Team (MTT) is a group of Officers and Senior NCOs that travel around the world to Army locations to teach soldiers on the following topics:

- The Army Safety Program
- Unit Safety Programs
- Accident Investigation and Reporting
- Risk Management
- Weapons and Range Safety
- Tactical Safety
- Army Motor Vehicle Safety, Occupational Safety and Health
- Privately Owned Vehicle Safety.

This is great training for those leaders that are down on the ground, doing the Army's business day in and day out.

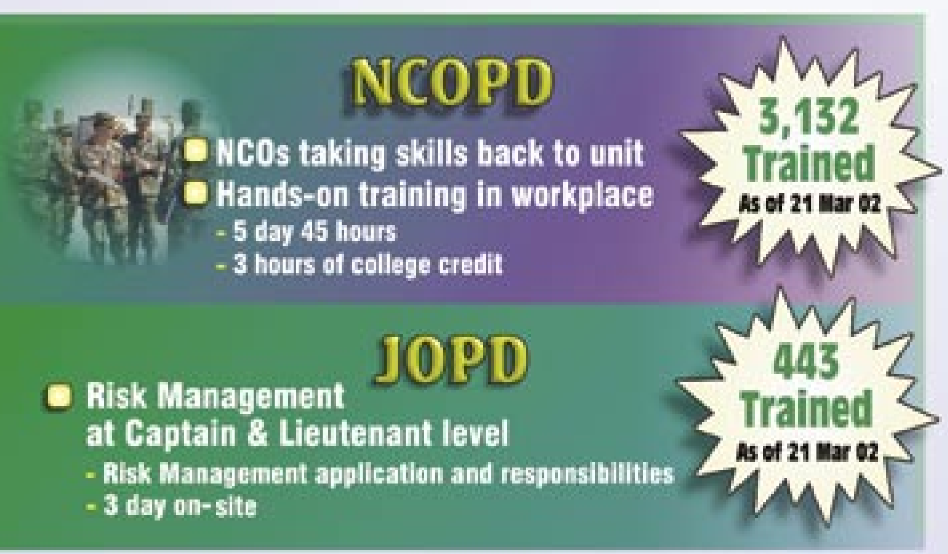
The first course is a five-day session that consists of 45-hours of safety related subjects. The target audience is NCOs. The class will have homework, multiple practical exercises, complete an Army Occupational Safety and Health Survey (SAOSHI), and undergo a 50-question exam. Upon completion of the course, the soldier will receive a certificate from the US Army Safety Center, a greater knowledge of the Army Safety Program, and three hours of college credit. The course is accredited by the American Council on Education through Texas A & M University.

Junior Officers, Too

The second course that we offer is geared toward young officers and Warrant Officer technicians. This 25-hour course is focused on hazards identification, risk management, the Army Safety Program, and leader responsibilities. The Junior Officer course will also go through a SAOSHI survey. This course typically runs from Tuesday-Thursday for three days.

The best part about these two courses is that it is free training to all command levels, to include Active Army, National Guard, and Reserve Component personnel. The U.S. Army Safety Center will provide these services at no monetary cost to Corps, Division, or Brigade-sized units and installations. The only cost to the unit is a commitment of time and selected personnel for three days or a single week, based on the course selected. The goal is to have at least 40 personnel attend the training. The Safety Center will do everything possible to accommodate the unit's training schedule and any other issues that the unit may have. If you have any questions please visit our website at, **http://safety.army.mil** and select the On-Site Training icon. Or give me a call and we can go over your questions in more detail.

—CW4 Anthony Kurtz, MTT Team Chief, USASC, DSN 558-2908 (334-255-2908) Anthony.Kurtz@safetycenter.army.mil



Creatures of the Night—

Tricking the aviator's body into night alertness

The issue of working reverse cycle in aviation is a complicated one. While aviators may be restricted by crew rest guidelines in how many hours they may fly, there is no restriction on *when* these hours may be flown. Many times aviators and other air crewmembers are required to fly or work at various times in the 24-hour day where they may need to reverse their work hours from typical duty day times to nights, early mornings, or late evenings. When this rotation occurs, aviators and crew members become "shift workers" in that they no longer work set hours, and may change their work hours every week, every 2-3 days, or possibly even on a daily basis, whether for the short-term or the long-term. When this happens, all the physiological symptoms typically experienced in shift work occur -- fatigue, sleepiness, insomnia, moodiness, etc. Along with these symptoms come performance problems and mistakes that can have disastrous consequences when flying.

The feelings of fatigue that people have when they rearrange their schedule (trying to stay awake at night and then sleeping during the day) are not unique. Almost everyone who works varying schedules feels sleepy or tired during the night, when they need to be alert and working. In addition, they experience difficulty sleeping during the day, when trying to recoup from a night of work. This is a normal feeling because night activity and day sleep are in opposition to the body's natural programming, or circadian rhythm.

The rhythms of wake and sleep, hormonal secretions, performance, and core body temperature, rise and fall in predictable patterns over the 24-hour day. As the day begins, body temperature, alertness, and performance are rising. This continues into the day, with a slight dip in the mid-afternoon, and then begins to fall as the day ends and night begins. In contrast, sleepiness declines as the day begins, has a small increase in the mid-afternoon, and then steadily increases as the day ends and night begins. The ability to go to sleep and stay asleep becomes increasingly difficult as the day progresses. One can readily determine why it is so difficult for shift workers to remain awake while on night shift, and sleep during daylight hours.

A host of activities—work, safety, health, family and social life—are affected when an individual experiences a constant change in schedules. So, what can the aviator or crewmember who works shifts do to make life easier and minimize feelings of irritability and tiredness? These suggestions can help:

■ Avoid caffeine 4-6 hours before bedtime.

■ Avoid sunlight after a night shift by wearing dark sunglasses while driving home.

■ Stay indoors and avoid sunlight as much as possible until your sleep period is complete.

■ Relax before sleep time. Avoid stimulating activities, such as house and yard work.

■ Avoid alcohol for at least 3 hours before bedtime.

■ Avoid strenuous exercise at least 3 hours before bedtime.

■ Get a minimum of 6 hours of sleep; take naps if you cannot get enough sleep at one time.

The above strategies are very good at promoting sleep. However, other strategies may be needed to stay asleep.

■ Sleep in your regular bedclothes and in your usual bed.

■ Have a comfortable mattress and pillow.

■ Make the bedroom cool and very dark.

■ Remove the phone from the room and discourage daytime visitors.

■ Disconnect the doorbell and hang a sign indicating a shift worker is sleeping.

■ Use earplugs and a masking noise like a fan to cover outside distractions.

■ Develop a sleep schedule.

■ Communicate with family and friends your need to sleep and your sleep schedule.

Although sleeping as well as possible during the day is a great start to being alert during the night, sleepiness at night will continue to occur. One cannot completely trick the body into being alert during the night, because there is a strong physiological drive for sleep at night. The human body can adapt somewhat to staying awake all night, but it takes many days of strict schedules before it adjusts, and most shift workers are off the night shift by the time this occurs. However, there are some strategies that can improve alertness at night.

■ Use caffeine carefully; wait until you need a boost.

■ Eat low carbohydrate, low fat, high protein foods.

■ Use social interactions and physical activity/postural changes to help stimulate your environment.

■ Stay cooler than usual.

■ Prepare in advance for changes in sleep schedules by gradually adjusting your sleep time.

■ Use naps to obtain as much sleep as possible before the night's work begins.

It's important to be aware that adjusting to rotating schedules and reverse cycle is not easy. However, taking care of some of the manageable variables will lead to improved safety on the ground and in the air, better work performance, better relationships with family and friends, and better general health.

—Dr. Lynn Caldwell, USAARL J. Lynn Caldwell, Ph.D. U.S. Army Aeromedical Research Laboratory Fort Rucker, AL 36362-0577

NEWS & notes

Remove before flight

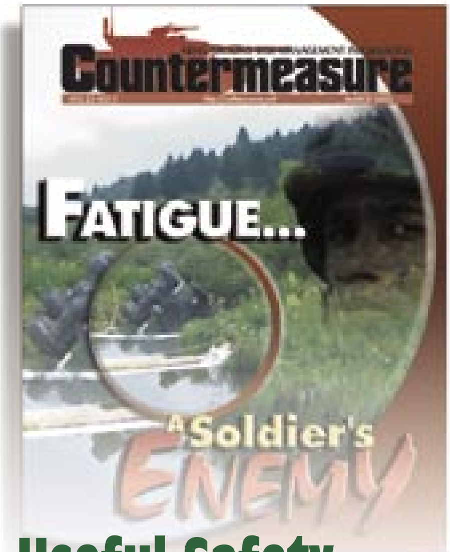
Please ensure your maintenance personnel are inspecting all maintenance equipment (rigging pins, plugs, etc.) that have safety streamers/"Remove Before Flight" flags for serviceability. We recently heard of another example of a maintenance catastrophe due to a safety streamer either not being installed or coming off the piece of equipment while it was in use. Also, plugs are being missed after completion of the maintenance tasks.

In one particular case, a vent plug was inadvertently left installed after fuel cell maintenance. During subsequent refueling operations, an overpressure condition resulted in catastrophic failure of the fuel tank. It comes back to the basics of following the -23 for fuel cell repair operations.

—Steve Vacula, AASF#2, TNARNG, DSN 266-4602 (865) 985-4602 Stephen.vacula@tn.ngb.army.mil

Small Unit Guide

It's here—the latest version of DA Pam 385-1, *Small Unit Safety Officer/NCO Guide*. It provides guidance for commanders and additional duty safety officers and NCOs to apply policies, procedures and information to develop and execute a unit safety program. The publication, dated 29 Nov 2001, is being distributed Army-wide. The electronic version can be found at the Safety Center web page: **http://safety.army.mil**; click: Guidance, then: Safety, and scroll down to find the link to DA Pam 385-1.



Useful Safety Center tools

Seen a copy of *Countermeasure* lately? That's the ground safety publication produced here at the Army Safety Center. Many safety issues addressed in *Countermeasure* also pertain to aviation unit ground operations. Sometimes we tend to think of certain topicsas ground or aviation issues. Many safety problems apply to both arenas. So check out *Countermeasure*. You'll find it useful.

If your unit doesn't receive *Countermeasure*, contact Sharrel Forehand, DSN 558-2062 (334) 255-2062 to be placed on distribution. Her e-mail is **Sharrel.Forehand@safetycenter.army.mil**

And don't forget the other handy tools available to you on the Safety Center website, such as the new POV country music videos. Just go to **http://safety.army.mil** and check out the quick view tool bar, or press the MEDIA button.

HELICOPTERS versus airplanes

The thing is, helicopters are different from airplanes.

An airplane by its nature wants to fly,
and if not interfered with too strongly by unusual events
or an unusually incompetent pilot,
it will fly.

A helicopter does not want to fly.
It is maintained in the air by a variety of forces and controls
working in opposition to each other,
and if there is any disturbance in this delicate balance
the helicopter stops flying,
immediately and disastrously.

There is no such thing as a gliding helicopter.

This is why being a helicopter pilot
is so different from being an airplane pilot,
and why, in generality,
airplane pilots are open, clear-eyed, buoyant extroverts
and helicopter pilots are brooders, introspective anticipators of trouble.

They know if something bad has not happened,
it is about to.

—Attributed to Harry Reasoner: Feb 16, 1971, Courtesy of Woodcrafters, Level Plains, Alabama